

Total solder points: 600

Difficulty level:

beginner 1  2  3  4  5  advanced

HIGH-Q  
**velleman-kit**



# MONO VALVE POWER AMPLIFIER MODULE

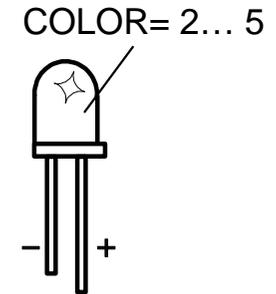
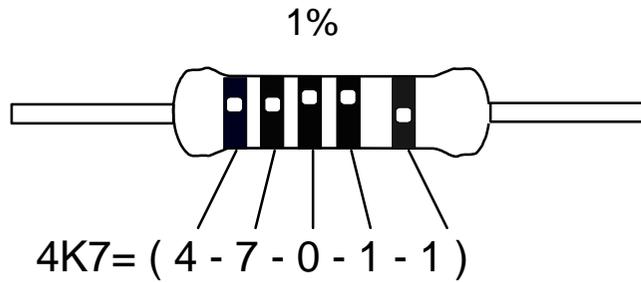
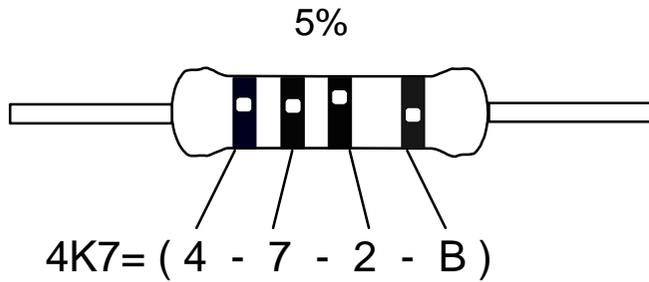
## K8011

- ⇒ Pure valve sound with EL34 valves
- ⇒ Easy bias adjustment with LED indication
- ⇒ High quality capacitors and components
- ⇒ Standby function
- ⇒ Soft start circuit for power transformer
- ⇒ Single PCB ensures hassle-free assembly and wiring
- ⇒ High quality toroid transformers
- ⇒ Sensitivity adjustment for exact level matching of two mono amps
- ⇒ A special chassis plate is also available, order code: CHP8011

### Specifications

- 90Wrms in 4 or 8Ω (at rated mains voltage)
- Bandwidth: 2Hz to 125KHz (-3dB/1W)
- Harmonic distortion: 0.1% @ 1W/1KHz
- Signal to noise ratio: 104dB (A weighted)
- Input sensitivity: 1Vrms min. (adjustable)
- Supply voltage: 100, 120, 230 or 245VAC
- Stand by power consumption: 60W
- Maximum power consumption: 230W
- PCB dimensions: 245 x 320mm (9.65" x 12.6")

modifications reserved



| C<br>O<br>D<br>E | I                        | P                              | E                                  | SF                    | S                      | DK                    | N                     | D                    | GB                     | F  | NL                    | C<br>O<br>D<br>E |
|------------------|--------------------------|--------------------------------|------------------------------------|-----------------------|------------------------|-----------------------|-----------------------|----------------------|------------------------|--|-----------------------|------------------|
|                  | <i>CODICE<br/>COLORE</i> | <i>CODIGO<br/>DE<br/>CORES</i> | <i>CODIGO<br/>DE COL-<br/>ORES</i> | <i>VÄRI<br/>KOODI</i> | <i>FÄRG<br/>SCHEMA</i> | <i>FARVE<br/>KODE</i> | <i>FARGE<br/>KODE</i> | <i>FARB<br/>KODE</i> | <i>COLOUR<br/>CODE</i> | <i>CODIFI-<br/>CATION<br/>DES<br/>COU-<br/>LEURS</i> | <i>KLEUR<br/>KODE</i> |                  |
| 0                | Nero                     | Preto                          | Negro                              | Musta                 | Svart                  | Sort                  | Sort                  | Schwarz              | Black                  | Noir   | Zwart                 | 0                |
| 1                | Marrone                  | Castanho                       | Marrón                             | Ruskea                | Brun                   | Brun                  | Brun                  | Braun                | Brown                  | Brun   | Bruin                 | 1                |
| 2                | Rosso                    | Encarnado                      | Rojo                               | Punainen              | Röd                    | Rød                   | Rød                   | Rot                  | Red                    | Rouge  | Rood                  | 2                |
| 3                | Aranciato                | Laranja                        | Naranjado                          | Oranssi               | Orange                 | Orange                | Orange                | Orange               | Orange                 | Orange   | Oranje                | 3                |
| 4                | Giallo                   | Amarelo                        | Amarillo                           | Keltainen             | Gul                    | Gul                   | Gul                   | Gelb                 | Yellow                 | Jaune  | Geel                  | 4                |
| 5                | Verde                    | Verde                          | Verde                              | Vihreä                | Grön                   | Grøn                  | Grønn                 | Grün                 | Green                  | Vert   | Groen                 | 5                |
| 6                | Blu                      | Azul                           | Azul                               | Sininen               | Blå                    | Blå                   | Blå                   | Blau                 | Blue                   | Blue   | Blauw                 | 6                |
| 7                | Viola                    | Violeta                        | Morado                             | Purppura              | Lila                   | Violet                | Violet                | Violet               | Purple                 | Violet   | Paars                 | 7                |
| 8                | Grigio                   | Cinzento                       | Gris                               | Harmaa                | Grå                    | Grå                   | Grå                   | Grau                 | Grey                   | Gris   | Grijs                 | 8                |
| 9                | Bianco                   | Branco                         | Blanco                             | Valkoinen             | Vit                    | Hvid                  | Hvidt                 | Weiss                | White                  | Blanc  | Wit                   | 9                |
| A                | Argento                  | Prateado                       | Plata                              | Hopea                 | Silver                 | Sølv                  | Sølv                  | Silber               | Silver                 | Argent   | Zilver                | A                |
| B                | Oro                      | Dourado                        | Oro                                | Kulta                 | Guld                   | Guld                  | Guldl                 | Gold                 | Gold                   | Or   | Goud                  | B                |

# MONO VALVE AMPLIFIER MODULE

## TECHNICAL DATA\*

- Output power: 90 Wrms (at rated supply voltage)
- Output impedance 4 or 8 Ohms
- Ultra linear toroid output transformer
- Switch-on delay, to protect the output valves: approx. 1 minute
- Standby circuit
- Built-in bias current indicator
- Switch-on delay for the supply transformer: 0.5s
- Power bandwidth: 8 - 45kHz (-3dB, ref. 50W)
- Frequency range: 2 Hz - 125kHz (-3dB, ref. 1W)
- Harmonic distortion: 0.1% (1 kHz/1W)
- Signal/noise ratio: > 104dB (A weighted wrt 90W)
- Input impedance: 100Kohm
- Input sensitivity: 1Vrms minimum (adjustable)
- Damping factor (100Hz): > 10
- Supply voltage: 100, 120, 230 or 245VAC
- PCB dimensions: 245 x 320mm

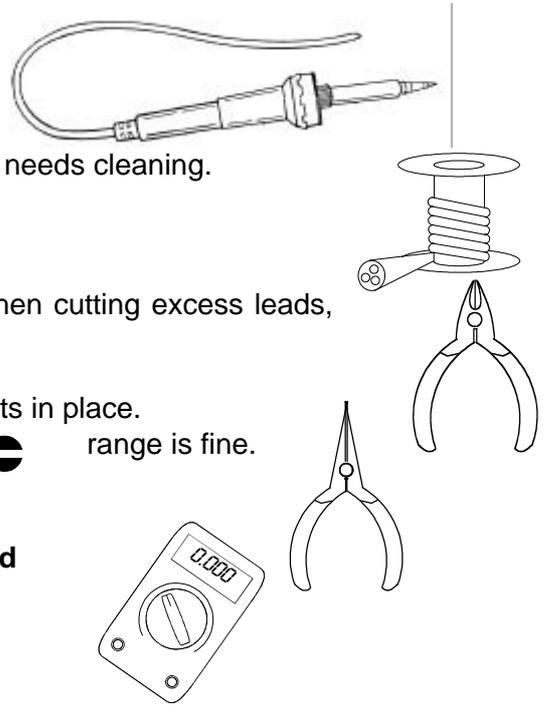
\*We reserve the right to make changes.

## 1. Assembly (Skipping this can lead to troubles !)

Ok, so we have your attention. These hints will help you to make this project successful. Read them carefully.

### 1.1 Make sure you have the right tools:

- A good quality soldering iron (25-40W) with a small tip.
- Wipe it often on a wet sponge or cloth, to keep it clean; then apply solder to the tip, to give it a wet look. This is called 'thinning' and will protect the tip, and enables you to make good connections. When solder rolls off the tip, it needs cleaning.
- Thin raisin-core solder. Do not use any flux or grease.
- A diagonal cutter to trim excess wires. To avoid injury when cutting excess leads, hold the lead so they cannot fly towards the eyes.
- Needle nose pliers, for bending leads, or to hold components in place.
- Small blade and phillips screwdrivers. A basic   range is fine.



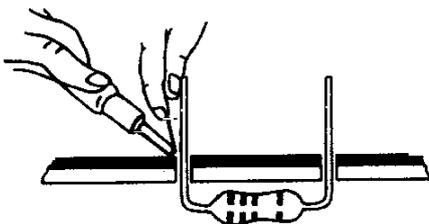
**For this projects, a basic multi-meter is required**

### 1.2 Assembly Hints :

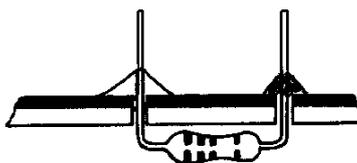
- ⇒ Make sure the skill level matches your experience, to avoid disappointments.
- ⇒ Follow the instructions carefully. Read and understand the entire step before you perform each operation.
- ⇒ Perform the assembly in the correct order as stated in this manual
- ⇒ Position all parts on the PCB (Printed Circuit Board) as shown on the drawings.
- ⇒ Values on the circuit diagram are subject to changes.
- ⇒ Values in this assembly guide are correct\*
- ⇒ Use the check-boxes to mark your progress.
- ⇒ Please read the included information on safety and customer service

\* Typographical inaccuracies excluded. Always look for possible last minute manual updates, indicated as 'NOTE' on a separate leaflet.

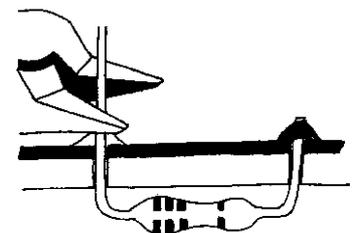
### 1.3 Soldering Hints :



Mount the component against the PCB surface and carefully solder the leads



Make sure the solder joints are cone-shaped and shiny



Trim excess leads as close as possible to the solder joint

## **Assembly of the main PCB P8011:**

### *Foreword:*

For best results and easy handling of the large PCB (Printed Circuit Board), we will start by putting the four large valve sockets in place. This will allow us to rest the board on the bench, without having the component leads touching the bench surface.

When the component leads are put in the appropriate holes on the PCB, we recommend to gently bend the leads outwards, so they stay on the board when it is flipped over to apply solder.

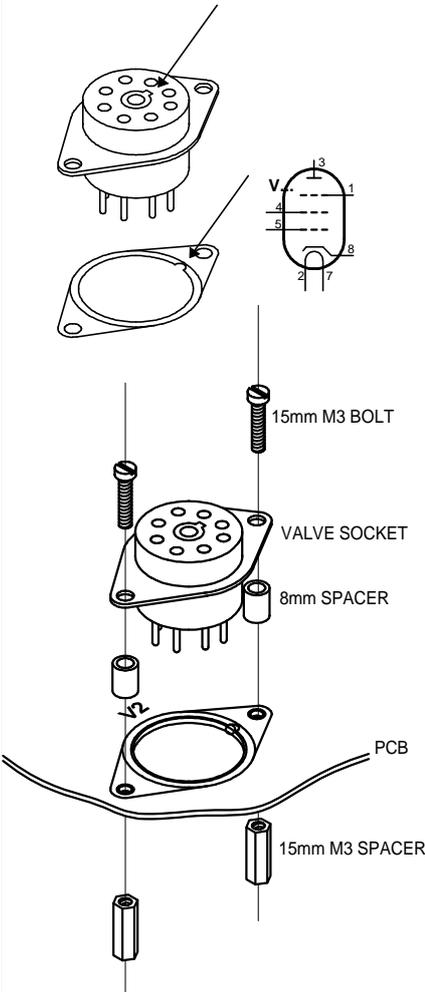
You gain a reasonable amount of time if you put approx. 10 components in place every time, before you flip the board, and make the solder joints.

## 1. VALVE SOCKET MOUNTING

Check the position of the notch in the centre of the tube socket, it must correspond to the notch in the circle printed on the PCB. Connect the leads to the corresponding isles on the PCB using a small piece of supplied jumper wire.

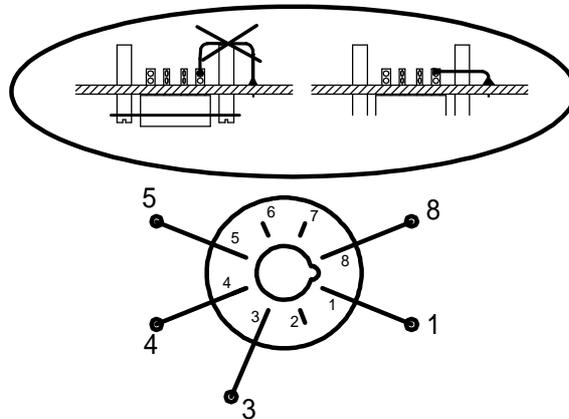
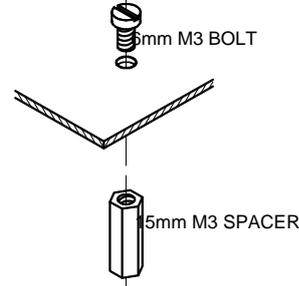
### IMPORTANT:

Make the connection exactly as shown in the illustration, otherwise the small piece of wire could touch the bottom of the cabinet, see further.



Also mount a 15 mm spacer on the remaining holes in the PCB (at the solder side), use a 6 mm M3 bolt:

- A spacer next to TRAF01
- A spacer next to SK15
- A spacer next to SK6
- A spacer next to R62
- A spacer next to V6
- A spacer next to SK19



- V1: Connect the valve socket terminals 1, 3, 4, 5, and 8 to the corresponding points at the solder side of the PCB.
- V2: Use a piece of supplied jumperwire. Mount the wire in such way that it cannot touch the bottom of the cabinet. (see above illustration).
- V3:
- V4:

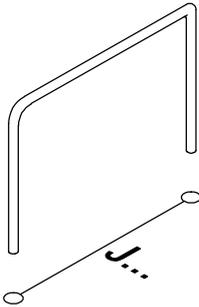
## 2. JUMPERS

Note that from J1 to J4, two jumper wires have to be mounted in the same hole, for extra current handling.

### TIP

In order to get nice straight wiring, without too much folding and measuring, follow these hints:

- Put the jumper wire in place
- Solder one end of the lead.
- Then carefully pull on the free end of the lead until it is straight, and apply solder



- J1 (mount 2 wires in the same hole)
- J2 (mount 2 wires in the same hole)
- J3 (mount 2 wires in the same hole)
- J4 (mount 2 wires in the same hole)
- J5
- J6
- J7
- J8
- J9
- J10
- J11
- J12
- J13
- J14
- J15
- J16
- J17
- J18
- J19
- J20
- J21

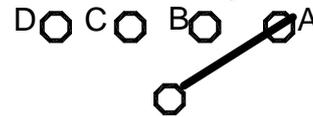
## 3. JUMPERS FOR AC POWER SELECTION

For **100V** input (mains), mount:

- JA** at the voltage selection 1

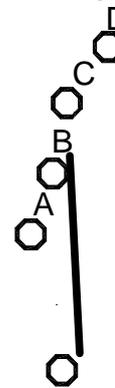


- JA** at the voltage selection 2

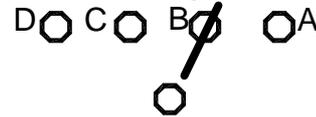


For **115V - 120V** input, mount:

- JB** at the voltage selection 1

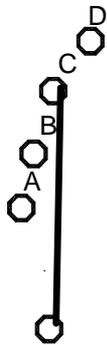


- JB** at the voltage selection 2

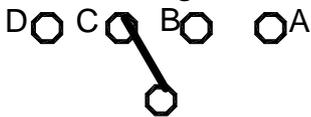


For **220V - 230V** input, mount:

- JC** at the voltage selection 1

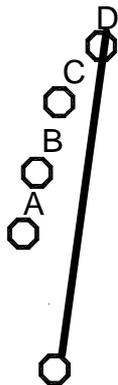


- JC** at the voltage selection 2

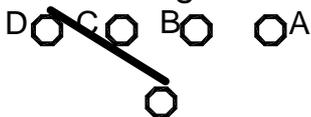


For **240V -245V** mains input, mount:

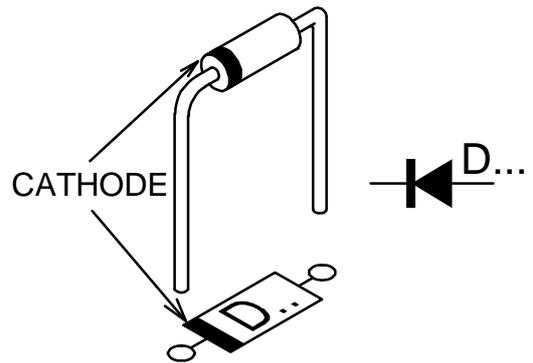
- JD** at the voltage selection 1



- JD** at the voltage selection 2



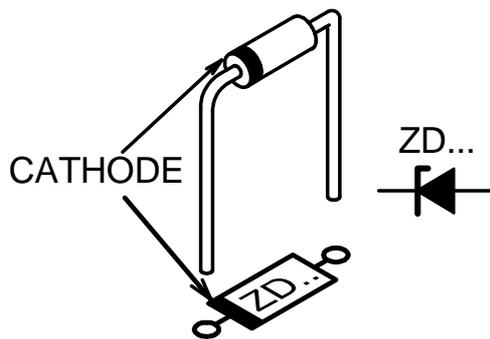
#### 4. DIODES (Check the polarity!)



- D1: 1N4148
- D2 :1N4148
- D3: 1N4007
- D4: 1N4148
- D5: 1N4007
- D6: 1N4148
- D7: 1N4148
- D8: 1N4148
- D9: 1N4007
- D10: 1N4007
- D11: 1N4007
- D12: 1N4007
- D13: 1N4007
- D14: 1N4007
- D15: 1N4007
- D16: 1N4007
- D17: 1N4007
- D18: 1N4007
- D19: 1N4007
- D20: 1N4007
- D21: 1N4007
- D22: 1N4007
- D23: 1N4007
- D24: 1N4148
- D25: 1N4148
- D26: 1N4148
- D27: 1N5408 not on tape !
- D28: 1N5408 not on tape !
- D29: 1N5408 not on tape !
- D30: 1N5408 not on tape !

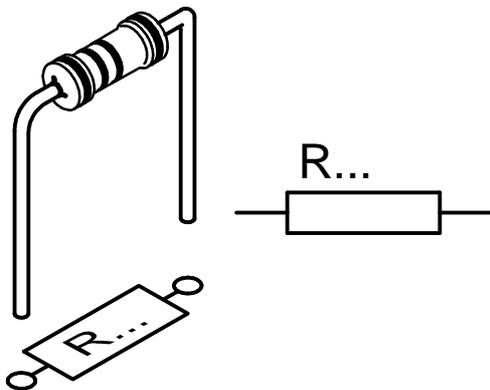
## 5. ZENER DIODES

(Check the polarity!)



- ZD1: 3V9
- ZD2: 3V9

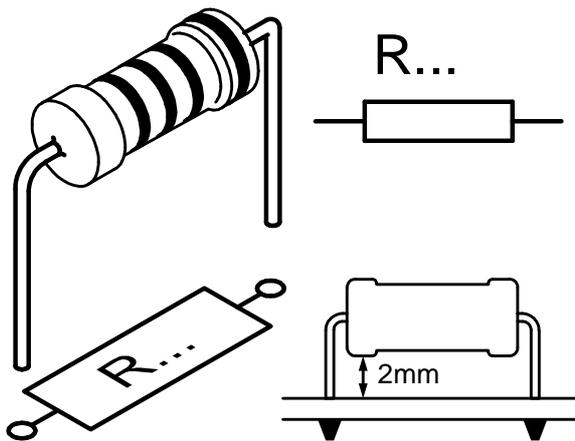
## 6. 1/4W & 1/2W RESISTORS



- R1: 470 (4 - 7 - 1 - B)
- R2: 220K (2 - 2 - 4 - B)
- R3: 2K2 (2 - 2 - 2 - B)
- R4: 2K2 (2 - 2 - 2 - B)
- R5: 220K (2 - 2 - 4 - B)
- R6: 100K (1 - 0 - 4 - B)
- R7: 1K (1 - 0 - 2 - B)
- R8: 1K (1 - 0 - 2 - B)
- R9: 22K (2 - 2 - 3 - B)
- R10: 3.3 (3 - 3 - B - B - 9)
- R11: 3K9 (3 - 9 - 2 - B)
- R12: 1K5 (1 - 5 - 2 - B)
- R13: 1M (1 - 0 - 5 - B)
- R14: 1M (1 - 0 - 5 - B)
- R15: 1K (1 - 0 - 2 - B)
- R16: 47K (4 - 7 - 3 - B)
- R17: 470K (4 - 7 - 4 - B)
- R18: 680 (6 - 8 - 1 - B)
- R19: 3K9 (3 - 9 - 2 - B)
- R20: 10K (1 - 0 - 3 - B)

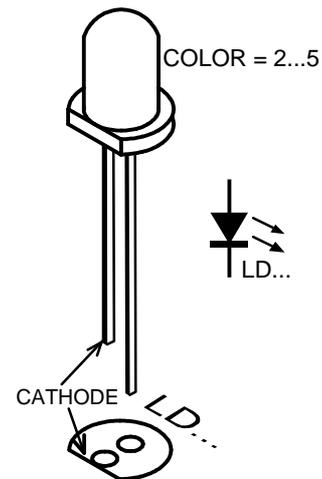
- R21: 10K (1 - 0 - 3 - B)
- R22: 1K5 (1 - 5 - 2 - B)
- R23: 1K2 (1 - 2 - 2 - B)
- R24: 560 (5 - 6 - 1 - B)
- R25: 100K (1 - 0 - 4 - B)
- R26: 220K (2 - 2 - 4 - B)
- R27: 100K (1 - 0 - 4 - B)
- R28: 220K (2 - 2 - 4 - B)
- R29: 10K (1 - 0 - 3 - B)
- R30: 4E7 (4 - 7 - B - B)
- R31: 1M5 (1 - 5 - 5 - B)
- R32: 1K5 (1 - 5 - 2 - B)
- R33: 33K (3 - 3 - 3 - B)
- R34: 8K2 (8 - 2 - 2 - B)
- R35: 220K (2 - 2 - 4 - B)
- R36: 10K (1 - 0 - 3 - B)
- R37: 100K (1 - 0 - 4 - B)
- R38: 220K (2 - 2 - 4 - B)
- R39: 100K (1 - 0 - 4 - B)
- R40: 220 (2 - 2 - 1 - B - 9)
- R41: 100K (1 - 0 - 4 - B - 9)
- R42: 47K (4 - 7 - 3 - B - 9)
- R43: 220 (2 - 2 - 1 - B - 9)
- R44: 220 (2 - 2 - 1 - B - 9)
- R45: 220 (2 - 2 - 1 - B - 9)
- R46: 2K2 (2 - 2 - 2 - B - 9)
- R47: 27K (2 - 7 - 3 - B - 9)
- R48: 220 (2 - 2 - 1 - B - 9)
- R49: 220 (2 - 2 - 1 - B - 9)
- R50: 100K (1 - 0 - 4 - B - 9)
- R51: 330K (3 - 3 - 4 - B - 9)
- R52: 330K (3 - 3 - 4 - B - 9)
- R53: 330K (3 - 3 - 4 - B - 9)
- R54: 330K (3 - 3 - 4 - B - 9)

## 7. 1W RESISTORS

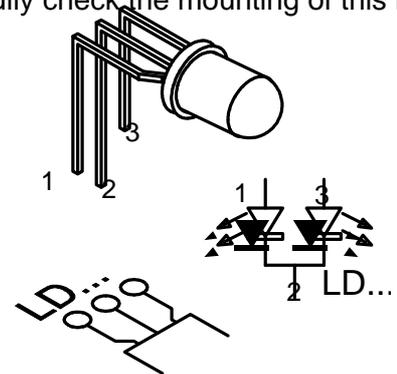


- R55: 270 (2 - 7 - 1 - B)
- R56: 10K (1 - 0 - 3 - B)
- R57: 10K (1 - 0 - 3 - B)
- R58: 12K (1 - 2 - 3 - B)
- R59: 39K (3 - 9 - 3 - B)
- R60: 39K (3 - 9 - 3 - B)
- R61: 39K (3 - 9 - 3 - B)
- R62: 100K (1 - 0 - 4 - B)
- R63: 47K (4 - 7 - 3 - B)
- R64: 47K (4 - 7 - 3 - B)
- R65: 10 (1 - 0 - 0 - B)
- R66: 10 (1 - 0 - 0 - B)
- R67: 180 (1 - 8 - 1 - B)
- R68: 180 (1 - 8 - 1 - B)
- R69: 180 (1 - 8 - 1 - B)
- R70: 10 (1 - 0 - 0 - B)
- R71: 10 (1 - 0 - 0 - B)
- R72: 180 (1 - 8 - 1 - B)

## 8. LEDs (Check the polarity!)



- LD1: 5mm red (2) blinking
- LD2: 3mm bicolor, power / standby / on indication:  
Carefully check the mounting of this LED:

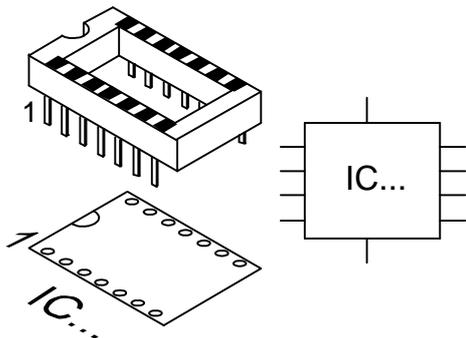


If wanted, above LED can also be mounted on a front panel. Then please use wires to make the connections 1, 2 and 3. Use the PCB terminal SK20 (see later section 27).

- LD3: 3mm YEL (4)
- LD4: 3mm YEL (4)
- LD5: 3mm YEL (4)
- LD6: 3mm YEL (4)
- LD7: 3mm GREEN (5)
- LD8: 3mm GREEN (5)
- LD9: 3mm RED (2)
- LD10: 3mm RED (2)
- LD11: 3mm RED (2)
- LD12: 3mm RED (2)
- LD13: 3mm RED (2) (next to R61)

## 9. IC SOCKETS

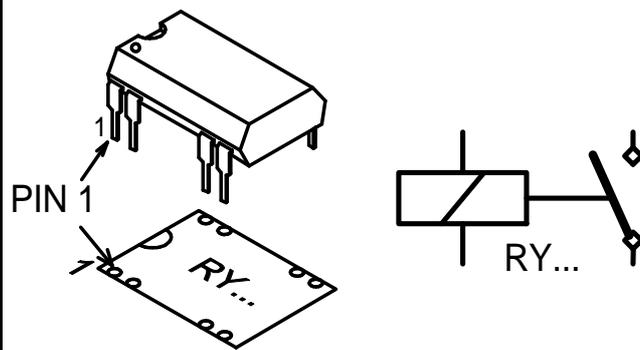
(Check the position of the notch!)



IC1: 18P

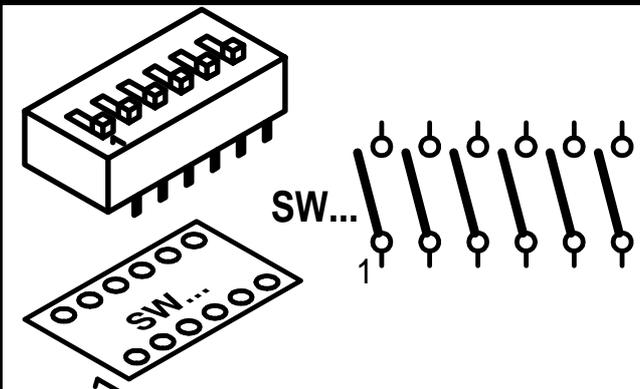
## 10. REED RELAY

(Check the position of the notch!)



RY1: VR05R121

## 11. DIP SWITCHES

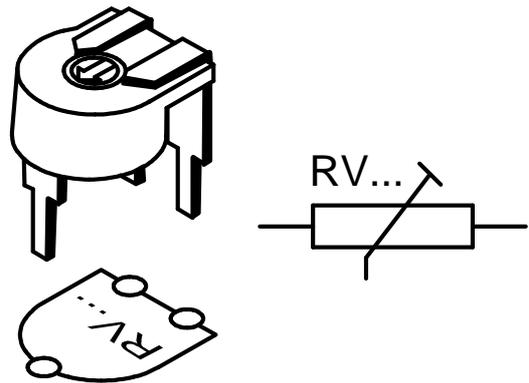


Check that switch 1 corresponds to pin 1.

SW2: DS-4

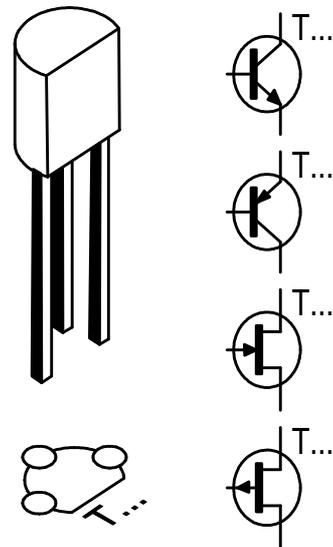
## 12. RESISTOR TRIMMERS

Horizontal type



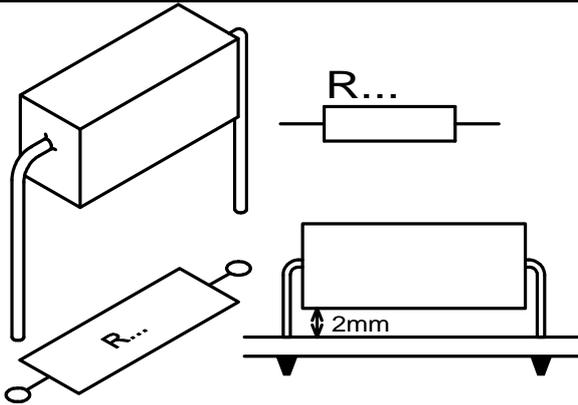
- RV1: 100K
- RV2: 100K
- RV3: 100K
- RV4: 100K
- RV5: 500K (470K)

## 13. TRANSISTORS



- T1: BC516
- T2: BC547C
- T3: BC547C
- T4: BC547C

### 14. 5W RESISTORS

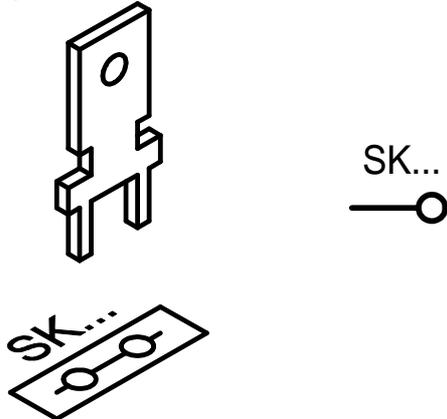


REMARK: You will have one 15 Ohm 5W resistors left over for later use.

- R73: 1E
- R74: 15
- R75: 15

### 15. PCB BLADE TERMINALS

Mount them as straight AS possible against the PCB. A good solder joint is very important !

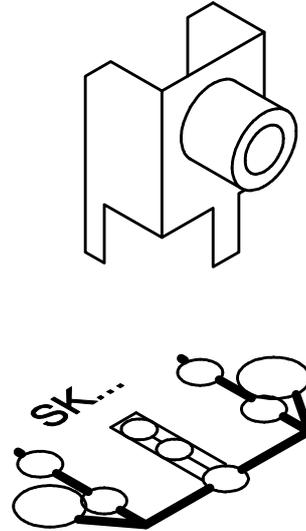


- SK1: 4 Ohm
- SK2: GND
- SK3: 8 Ohm
- SK4: BLUE
- SK5: RED
- SK6: YELLOW
- SK7: GRAY
- SK8: GRAY
- SK9: GREEN
- SK10: GREEN

SK21 and SK22 will not be used

### 16. CINCH / RCA CONNECTOR

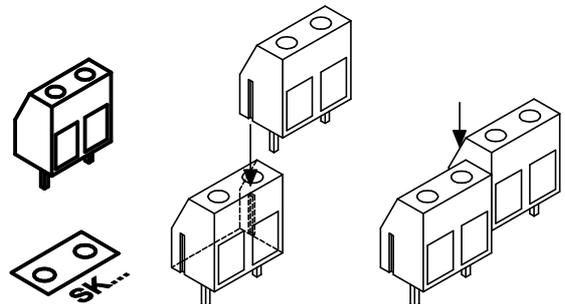
Mount it as straight and square as possible against the PCB.



- SK11: CINFP/90

### 17. PCB TERMINAL BLOCK

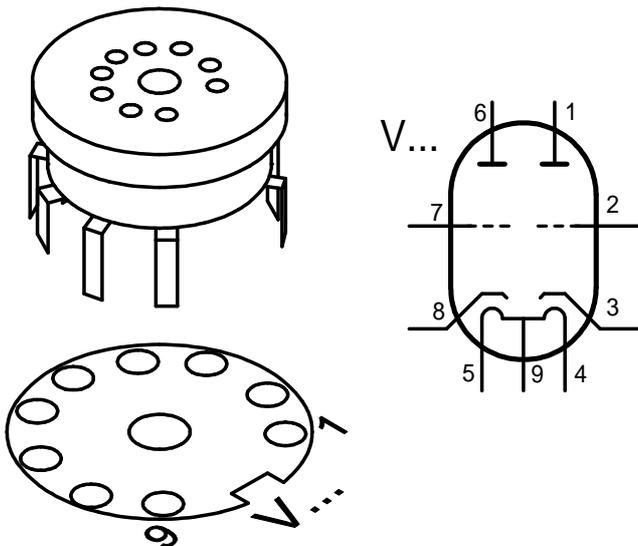
some blocks slide one into each other !



Mount these terminals with the wire inputs facing the PCB edge (except for SK20, which should be mounted facing LD1).

- SK12: 2 POLE (large)
- SK13: 3 POLE
- SK14: 3 POLE
- SK15: 3 POLE
- SK16: 3 POLE
- SK17: 3 POLE
- SK18: 3 POLE
- SK19: 3 POLE
- SK20: 3 POLE

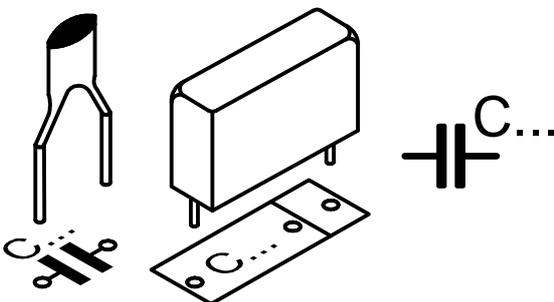
## 18. VALVE SOCKET



Mount them square against the PCB

- V5: B9A
- V6: B9A

## 19. CAPACITORS



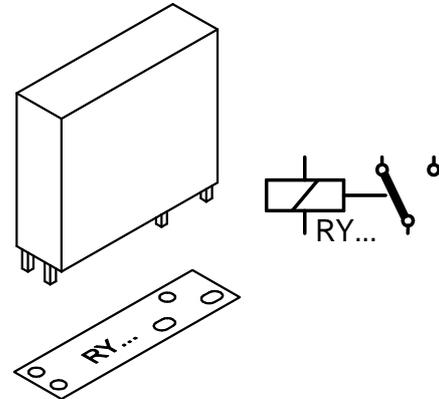
Check the voltage rating !

- C1: 47nF (473, 0.047, 47000)
- C2: 100pF (101)
- C3: 330pF/400V (331)
- C4: 330pF/400V (331)
- C5: 68n/630V (683, 0.068)
- C6: 68n/630V (683, 0.068)
- C7: 68n/630V (683, 0.068)
- C8: 68n/630V (683, 0.068)
- C9: 68n/630V (683, 0.068)
- C10: 68n/630V (683, 0.068)
- C11: 680n/160V (684, 0.68)
- C12: 680n/160V (684, 0.68)
- C13: 680n/160V (684, 0.68)

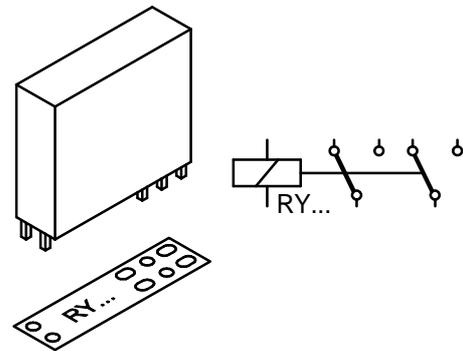
## 20. POWER RELAYS

The various relays have footprints that correspond to the footprints on the PCB :

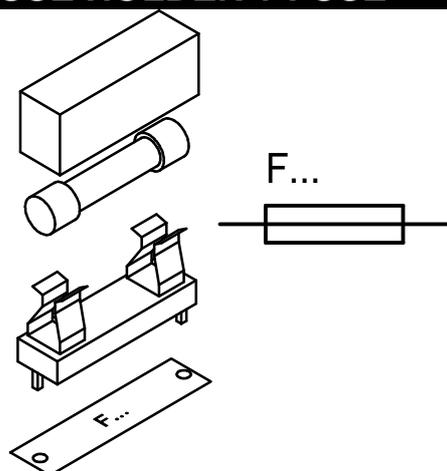
- RY2: VR10V121C
- RY3: VR10V121C



- RY4: VR5V122C

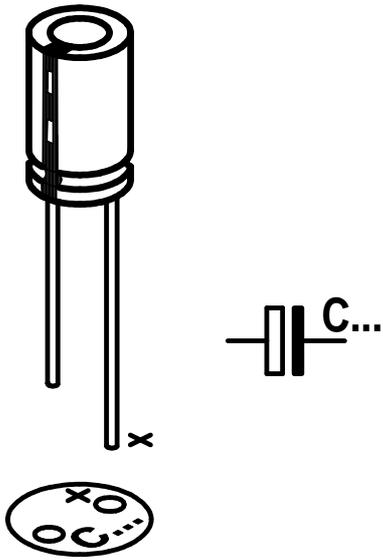


## 21. FUSE HOLDER + FUSE



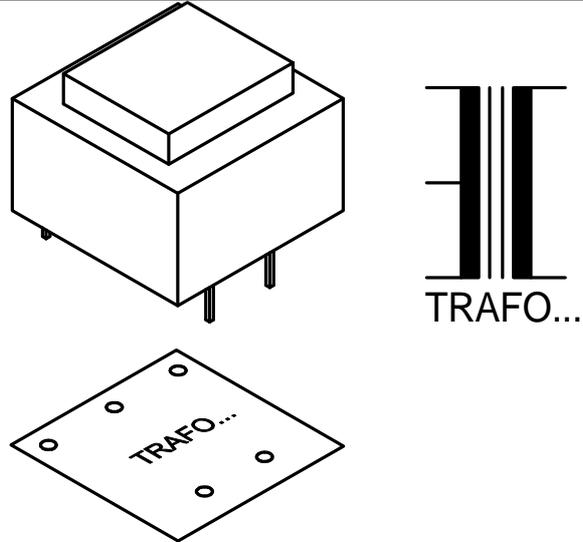
- F1: Fuseholder + cover
- 4A FUSE @ 230 - 245V or
- 8A FUSE @ 100 - 110V

## 22. ELECTROLYTIC CAPACITOR (Check the polarity!)



- C14: 4 $\mu$ F7
- C15: 100 $\mu$ F
- C16: 470 $\mu$ F
- C17: 470 $\mu$ F
- C18: 470 $\mu$ F
- C19: 470 $\mu$ F
- C20: 47 $\mu$ F/100V
- C21: 100 $\mu$ F/100V
- C22: 1000 $\mu$ F
- C23: 4700 $\mu$ F
- C24: 47 $\mu$ F/350V
- C25: 47 $\mu$ F/350V
- C26: 100 $\mu$ F
- C27: 1 $\mu$ F

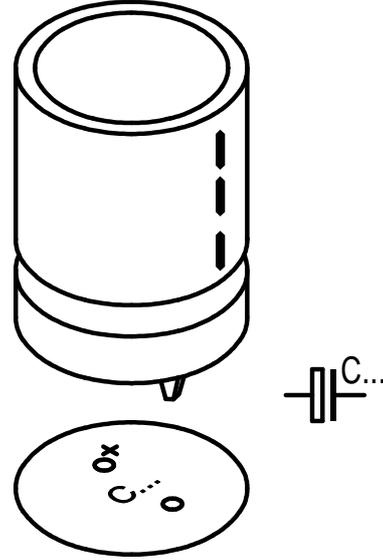
## 23. TRANSFORMER



- TRAFO1: 12VAC

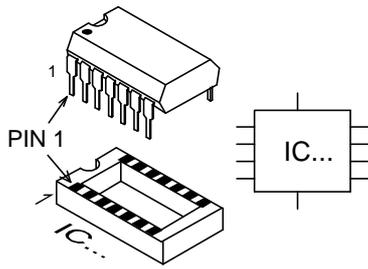
## 24. ELECTROLYTIC CAPACITOR (Check the polarity!)

Generally these capacitors are of the snap-in type and cannot be mounted incorrectly.



- C28: 100u/400V
  - C29: 220u/450V
  - C30: 220u/450V
- C31 will not be used

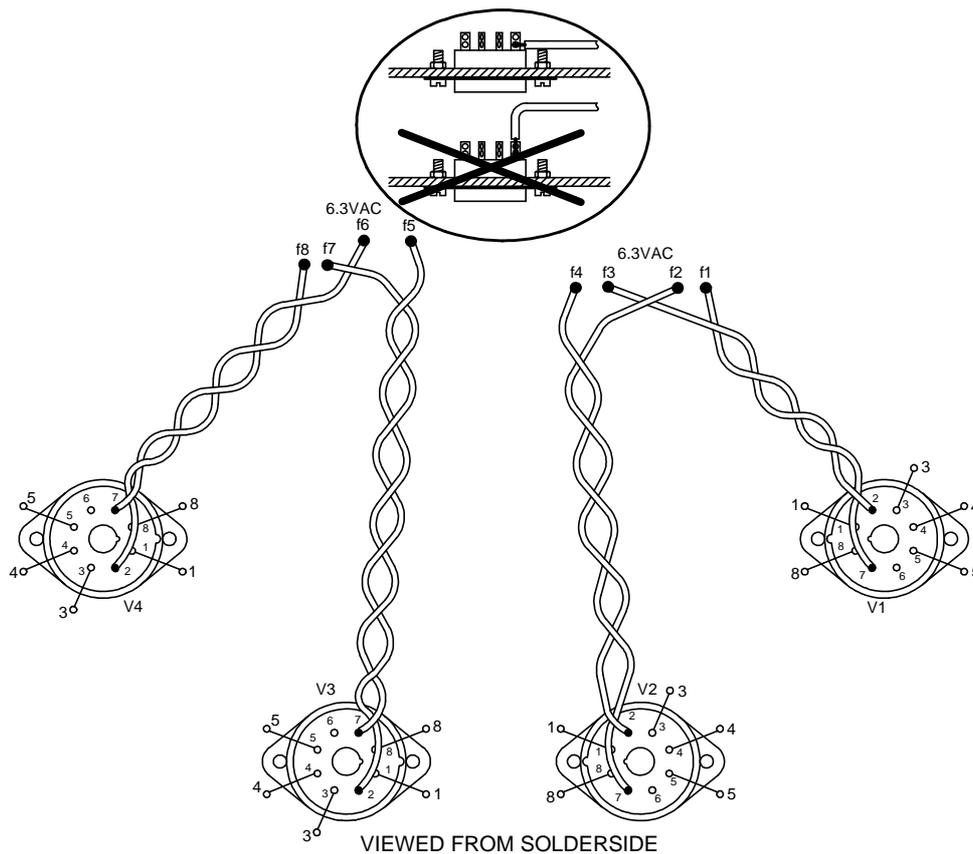
## 25. INSERT THE IC (Check the position of the notch!)



❑ IC1: LM3914

## 26. 6.3V VALVE WIRING

- ❑ Wiring for the 4 valve sockets V1 to V4. Use the supplied brown wire. Twist them as shown in the illustration. The polarity is not important. For safety, it is advisable to check with an ohmmeter that the two 6.3V terminals are not shorted when the wiring is completed.



Check the complete assembly again for errors. Pay special attention to bad solder joints and wrongly inserted or misplaced components !

## 27. FINAL ASSEMBLY AND WIRING

Please pay attention to the following hints, for best results :

- Mount the module on a **grounded** metal chassis.
- A suitable chassis can be ordered separately (order code CP8011)
- The PCB ground is automatically connected to the metal chassis by means of the metal spacer located next to the RCA input. A 470 Ohm resistor avoids hum loops.
- Provide plenty of ventilation, as tubes run very hot.
- Use the provided mains inlet, together with a suitable 3-conductor mains cord (not included).
- For best results, position the transformers as described.
- Take care about electrical safety. The PCB carries lethal voltages !

### Mounting of the optional CHP8011 chassis

- Bend the rear plate as show in the illustration. Pay attention to the right bending direction.

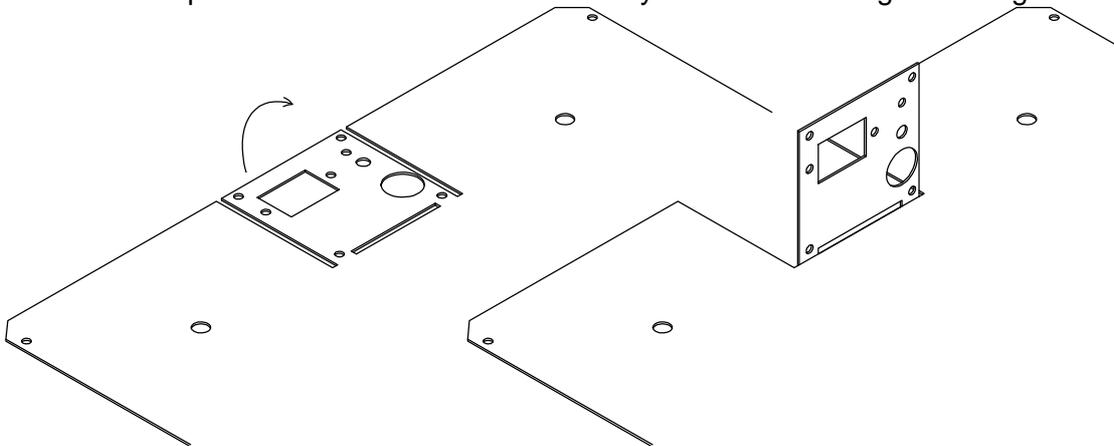


FIG 1

- Mount the switch a shown in the illustration.

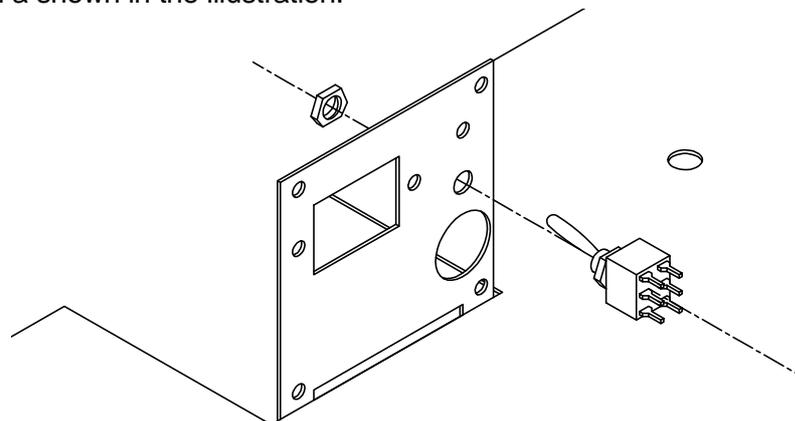


FIG 2

- Mount the LED, using the included support (see illustration).

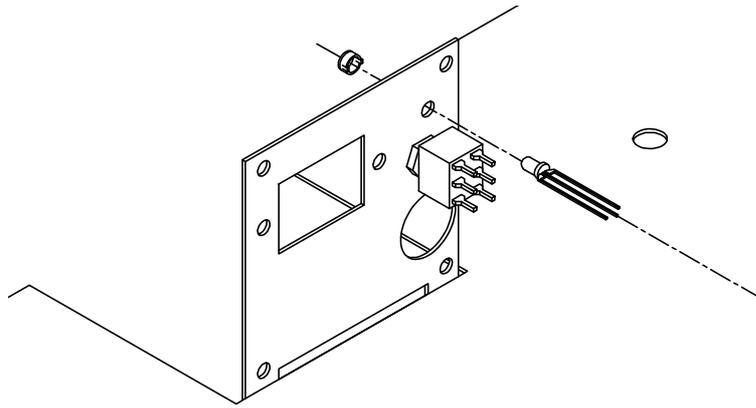


FIG 3

- Fasten the mains inlet with two suitable bolts and nuts.

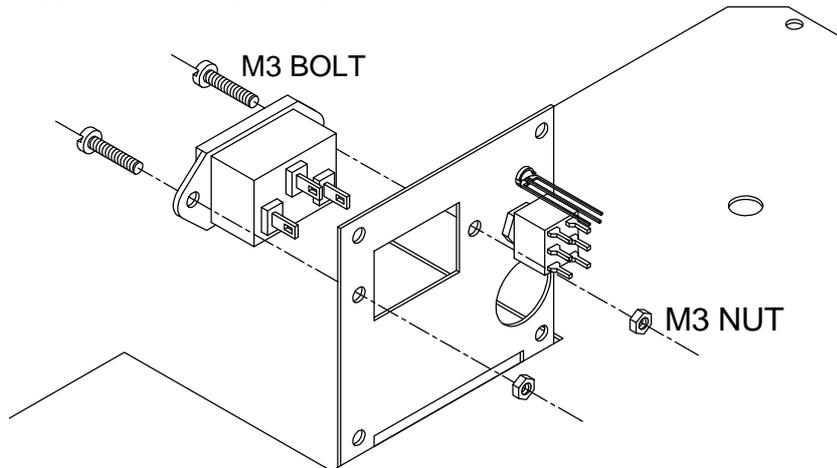


FIG 4

- Fasten the PCB to the chassis with M3 bolts.
- Mount the supply transformer (the smallest of both transformers) on the left hand side as shown in the illustration. Use the supplied rubber washer and M8 bolt.

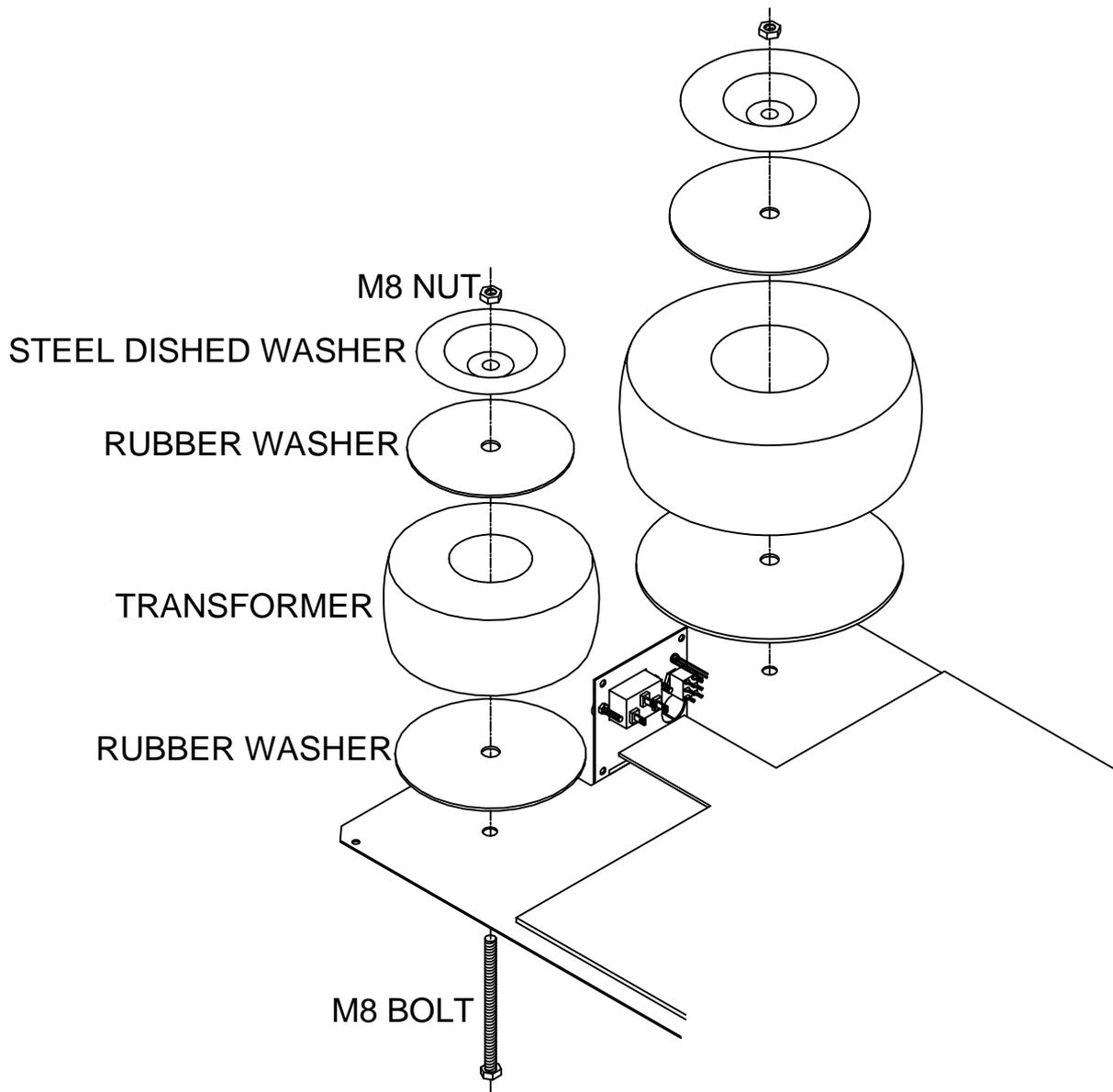


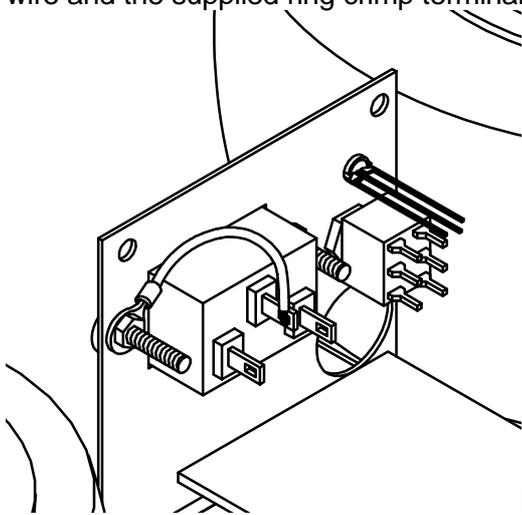
FIG 5

- The output transformer (type ZD043) is mounted on the right hand side, in a similar way.

**Wiring :**

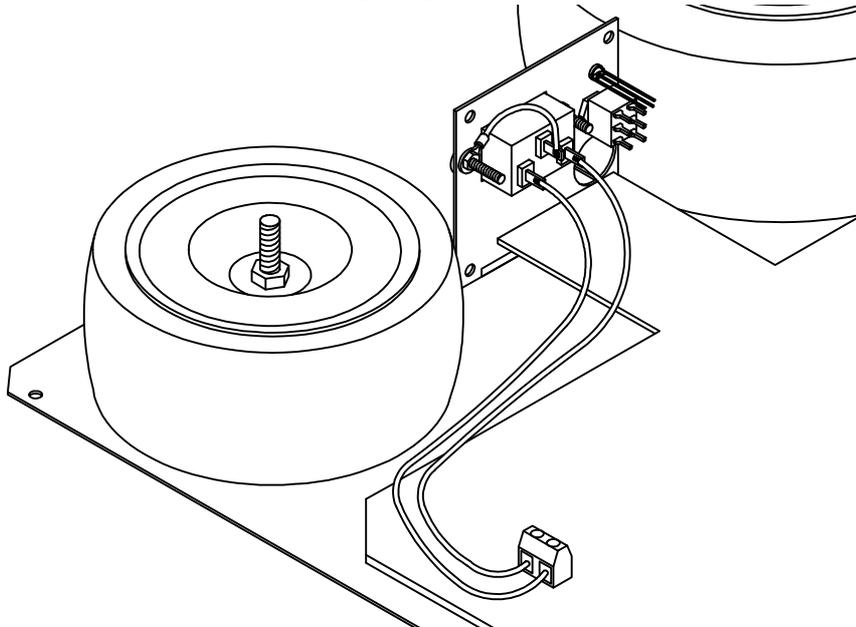
The mains inlet :

The earth pin must be hooked-up to the chassis as shown in the illustration. Use a length of yellow/green wire and the supplied ring crimp terminal.



**FIG 6**

Connect the mains inlet with SK12 on the PCB. Use suitable leads of at least 0.5mm<sup>2</sup>



**FIG 7**

**REMARK :** Fill out the included power rating label, and stick it onto the chassis or enclosure, on a clearly visible location.

The transformers :

 **IMPORTANT:** Do not trim the wires of the transformers, leave them at their original length. If there is more than one conductor in an insulating sleeve, you have to make sure they are soldered together and make a good electrical connection before they are connected to a screw terminal.

Power transformer :

- Connect the power transformer with the connectors marked '**FROM POWER TRANSFORMER**' on the PCB.
- Connect the sturdy grey wires to the connectors marked SK7 and SK8 (**GRAY**) . The remaining green wires must be hooked-up to the connectors marked SK9 and SK10 (**GREEN**).

Output transformer (ZD043):

- Connect the double yellow wire with the connector marked '**YELLOW**' SK6.
- Connect the red wire with the connector marked '**RED**' SK5.
- Connect the blue wire with the connector marked '**BLUE**' SK4.
- Use female push-on connectors and solder them to the wires for best results.

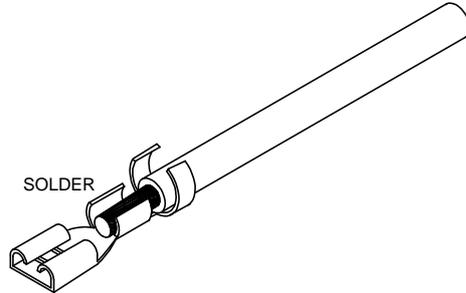


FIG 8

- Connect the remaining leads to the connectors SK16 and SK17. Pay attention to the colors.

Function switch :

- Use an appropriate length of the supplied multicore cable and make the connection between the switch and SK18 as shown by the illustration.

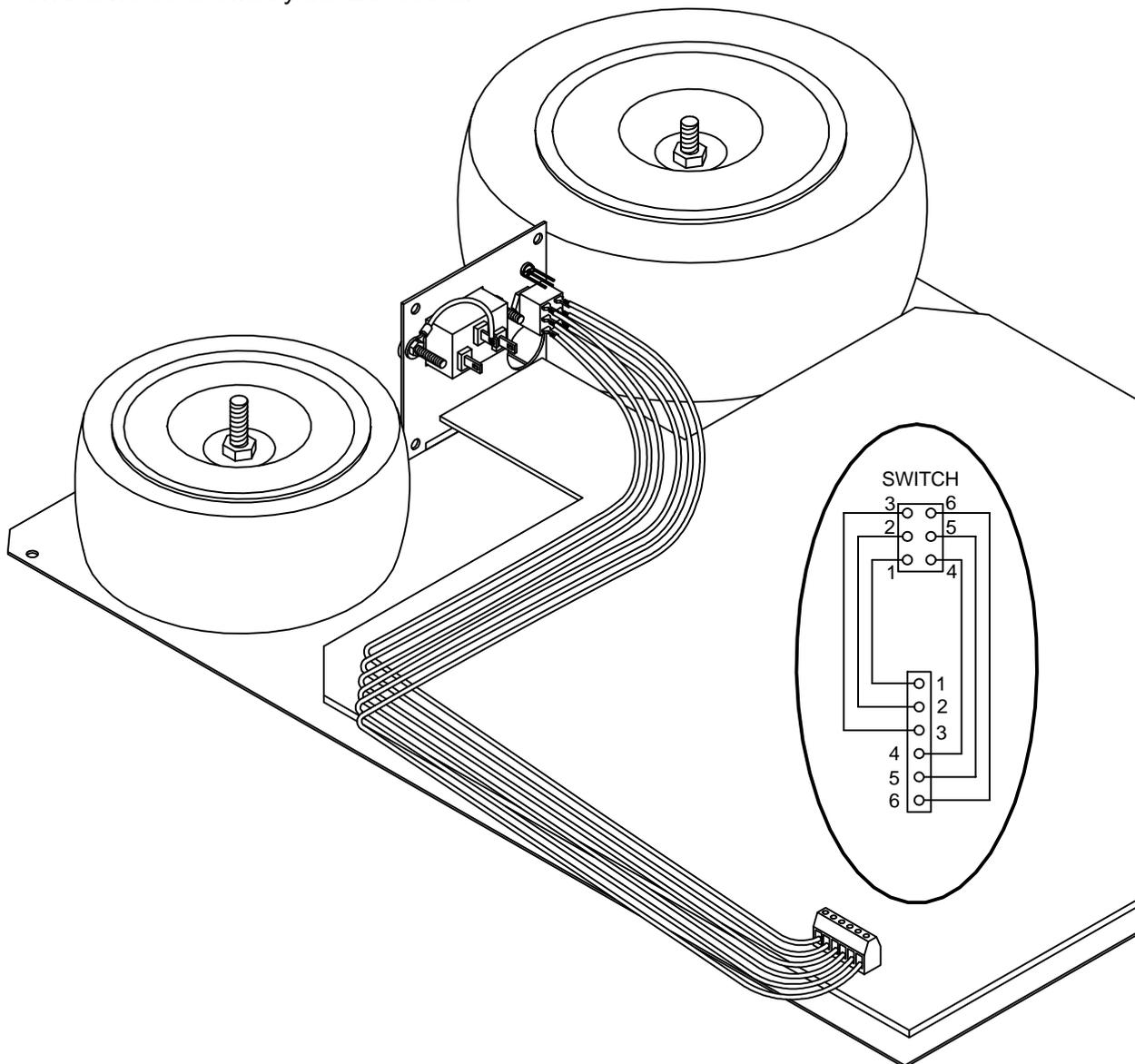


FIG 9



Function LED :

- Use an appropriate length of the supplied multicore cable and make the connection between the two-color LED and SK20 as shown by the illustration. Pay attention to the correct position of the LED.

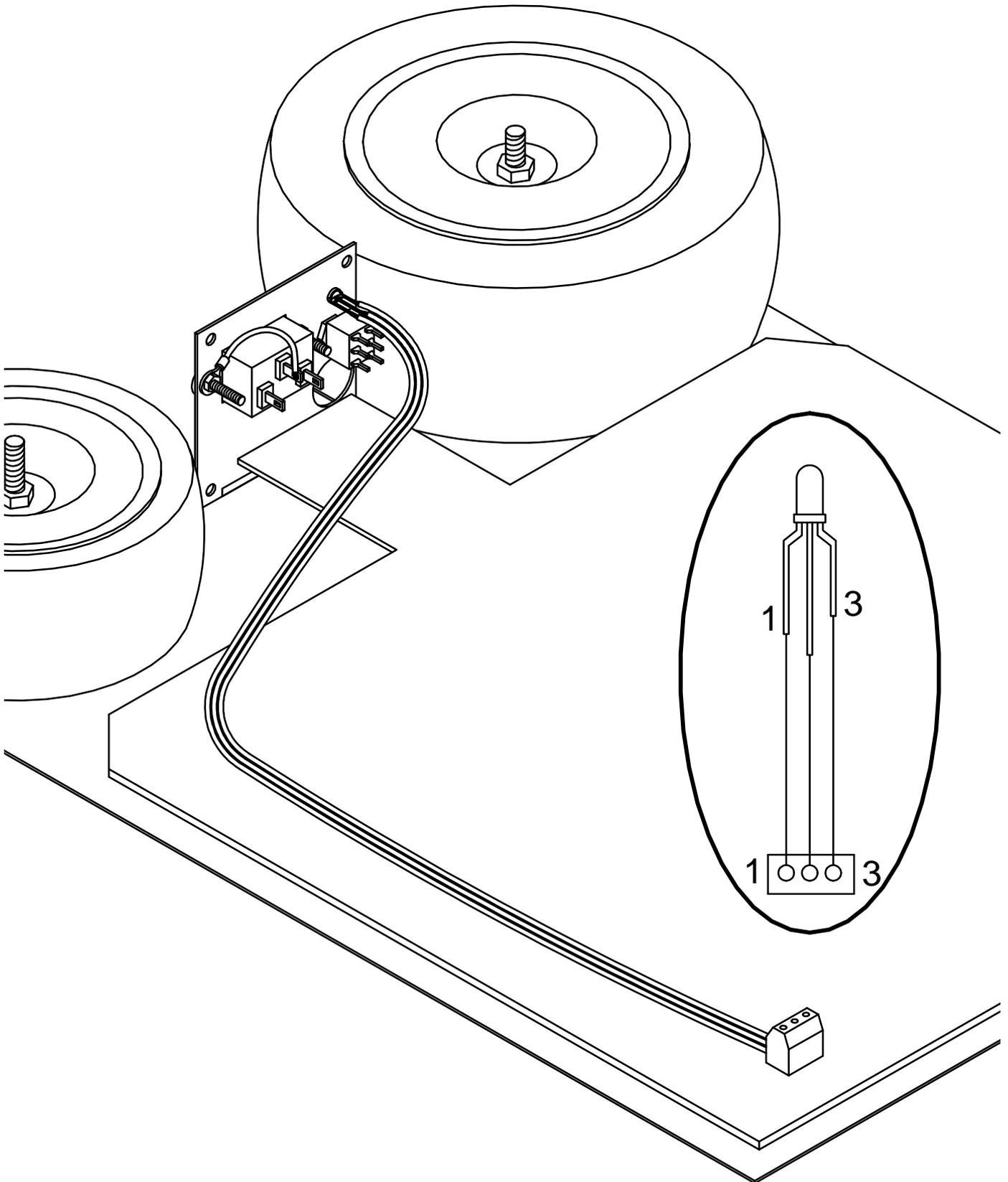


FIG 10

## FINAL INSPECTION :

**⚠ WARNING : THE PCB CARRIES VOLTAGES THAT EXCEED 400V !  
THESE VOLTAGES CAN KILL ! MAKE SURE NO ONE CAN TOUCH ANY LIVE PARTS  
Use suitable isolated measuring equipment**

- Put the mains switch into its fully OFF position (all the way down).
- Connect the unit to a wall outlet, by means of an appropriate 3 conductor cord.  
If the mains voltage is present, LD2 should light continuously red.
- Turn the unit on by pushing the mains switch to its fully upward position.  
LD2 should now blink for a while, this indicates the standby mode. After approximately one minute, LD2 should light continuously green, indicating 'ON', and a relay should click.
- Now check the following voltages with a multimeter:  
Measure about 6.3VAC between SK7-SK8 and SK9-SK10  
Measure about 6.3VAC between pins 2 and 7 of the tube sockets V1 to V4

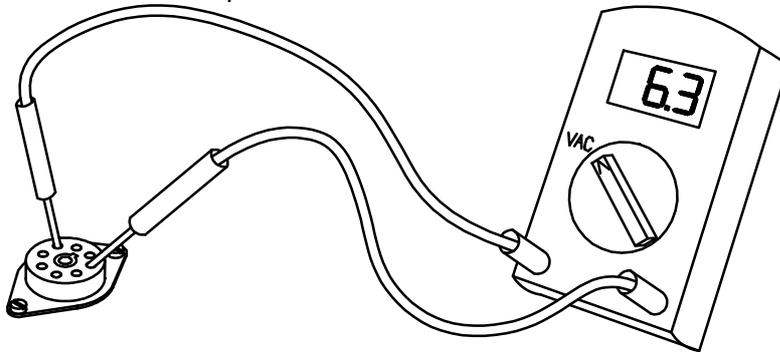


FIG 11

**⚠ SWITCH OFF THE UNIT AND REMOVE THE MAINS PLUG. WAIT A COUPLE OF MINUTES  
UNTIL THE DANGEROUS HIGH VOLTAGE HAS DISSAPEARED  
(UNTIL HIGH VOLTAGE INDICATOR LD13 TURNS OFF)**

- Put the small valves in place:  
V6 type ECC82 or 12AU7, CV491, 6189, 8136  
V5 type ECC81 or 12AT7, CV455, 6201, 8162
- Reconnect the mains plug, and switch the unit ON again (switch in full upward position)  
Wait until LD2 lights green continuously.
- Now check all indicated voltages on the PCB with respect to ground. A suitable ground for these measurements is J4, at the centre of the PCB. The point indicated VB2 should carry approx. 0.45VDC.

**REMARK :** All voltages may vary a bit, due to mains voltage fluctuations. At this stage, you cannot measure the 0.4VDC voltages yet.

## CALIBRATION

Switch off the unit, disconnect the mains plug and wait until the high voltage has disappeared.  
Turn the trim potentiometers RV1 to RV4 fully counter clockwise with a small screwdriver.  
Put the four EL34 (C6A7, CV1741) or equal tubes in their sockets. Watch the position of the notch.

**IMPORTANT** : The remaining 15 Ohm / 5W resistor must be hooked up between the centre and the 8 ohm speaker terminal at the back of the unit. A valve amplifier must **never** be operated without a suitable load at the speaker terminals. Make sure there is a good electrical connection between the terminals and the resistor.

### Bias current calibration

This calibration does not require a measuring instrument, as the bias level of each tube can be displayed on the LED scale. The four dipswitches allow valve selection, while each valve has its own trim potentiometer. RV1 controls V1, RV2 controls V2 etc...

**IMPORTANT** : This calibration determines the bias current through the expensive output valves. Therefore, it requires your absolute attention. Perform the calibration in the correct order. No signal may be present at the input of the amplifier, during the calibration.

Flip all four DIP switches (SW2) to their OFF position  
Every switch enables the bias readout of one valve, so do not switch on more than one at a time, or the readout will be incorrect.

Reconnect the mains plug, and switch the unit ON again (switch in full upward position)  
Wait until LD2 lights green continuously.

Put the first switch in the ON position (use a pen or a small screwdriver)  
Gently turn RV1 clockwise until the second or third LED lights (LD4 or LD5)  
Switch off the first switch.  
Switch on the second switch  
Gently turn RV2 clockwise until the second or third LED lights (LD4 or LD5)

Perform the same operation with RV3 and RV4

Wait for about 10 minutes, before continuing the rest of the calibration.

Repeat the calibration of RV1 to RV4, but this time the trim potentiometers must be turned clockwise until one or two green LEDs light.

When this operation is finished, check the 0.4V DC voltages at R65, R66, R70 and R71. Again, use J4 as ground reference.

## FINALLY !

It is time to listen to your amplifier !

Switch off the unit completely before connecting or disconnecting any cables.

Connect a 4 or 8 ohm speaker to the correct terminals on the PCB. Speakers with impedance's between 4 and 8 ohms can be connected to the 8 ohm terminal.

The common negative speaker terminal is located in between the 4 and 8 ohm positive terminals.

Hook up an audio source to the RCA connector. Make sure the volume control of the source is set to minimum before the unit is turned on.

The 'SENSITIVITY' trimmer located at the centre of the board allows you to trim the amplifiers input sensitivity, so two units put out exactly the same level, which improves the stereo image. Normally, this trimmer should be set fully clockwise.

If necessary, feed a mono signal to both amplifiers, and trim both sensitivity trimmers, until the sound comes from the exact centre between both loudspeakers.

- **Valve amplifiers run hot ! Operate them in a well ventilated area ! Do not put them in a closed rack, stack or cabinet.**
- **It is a good habit to check the bias current on a regular basis, especially when the valves are new.**
- **They need to run-in for a while, during which the bias level may shift.**
- **For short intervals between listening sessions, put the amplifier in stand-by mode (mains switch in middle position).**



**THIS AMPLIFIER RUNS HOT, OPERATE IT OUT OF THE REACH OF CHILDREN !  
CHECK YOUR MAINS VOLTAGE**

**MAKE SURE IT MATCHES THE SELECTED VOLTAGE**

**REMOVE THE MAINS PLUG AND WAIT AT LEAST 15 MINUTES BEFORE REMOVING THE  
COVERS**

**SOME PARTS MAY CARRY DANGEROUS VOLTAGES, EVEN WHEN THE UNIT IS UNPLUGGED**

## TROUBLESHOOTING

Hum coming from the speakers :

To make sure the amplifier is the source of hum, short the RCA input (by means of a spare male RCA plug, which you short internally), and disconnect the mains earth connector.

As a reference, listen at about 1m (3 ft) from the speaker, there should be an negligible amount of hum present.

If there's still a reasonable amount of hum present, check the bias current of every valve. Also check the electrical connection between the PCB ground and the chassis, which is done trough the bolt next to R1.

A defective valve can also be a source of hum.

If hum is only present, when the amplifier is hooked up to an audio system, then a hum-loop could be the cause. To verify if this is the case, disconnect the mains earth.

Use good quality, as short as possible, interconnecting leads.

For best results, choose equal lengths for both left and right amplifier.

If the high tension is not present, check the transformer wiring and the mains fuse, located at the back of the unit, below the mains inlet.

An intermitted crackling sound coming from the speakers could point to a defective resistor R62.

Replace it with the same value and power rating.

A continuous buzzing sound coming from the speakers or a crackling sound during bass peaks could be caused by oscillation of the amplifier.

In this case, try raising the value of R46 (e.g. 2K7 or even 3K3). This will also slightly increase the input sensitivity.

If your speaker system includes a piezo driver, make sure it has a 10 ohm/ 1W resistor in series with the unit.

**THE MODIFICATIONS MENTIONED ABOVE ARE ONLY TO BE PERFORMED WHEN REPEATED INSPECTION OF THE CIRCUIT BOARD, SOLDER JOINTS AND WIRING DID NOT POINT TO ANY OBVIOUS FAULTS OR MISTAKES OF ANY KIND.**

**REMARK:** Valves are very sensitive to mechanical shocks. Therefore, we recommend not to move the unit when the valves are hot. Always let them cool down for a while. Avoid sudden temperature changes, e.g. when the unit is moved from a cold room to a heated room. Always leave it idle for a while, so it can adapt to the new environmental condition.

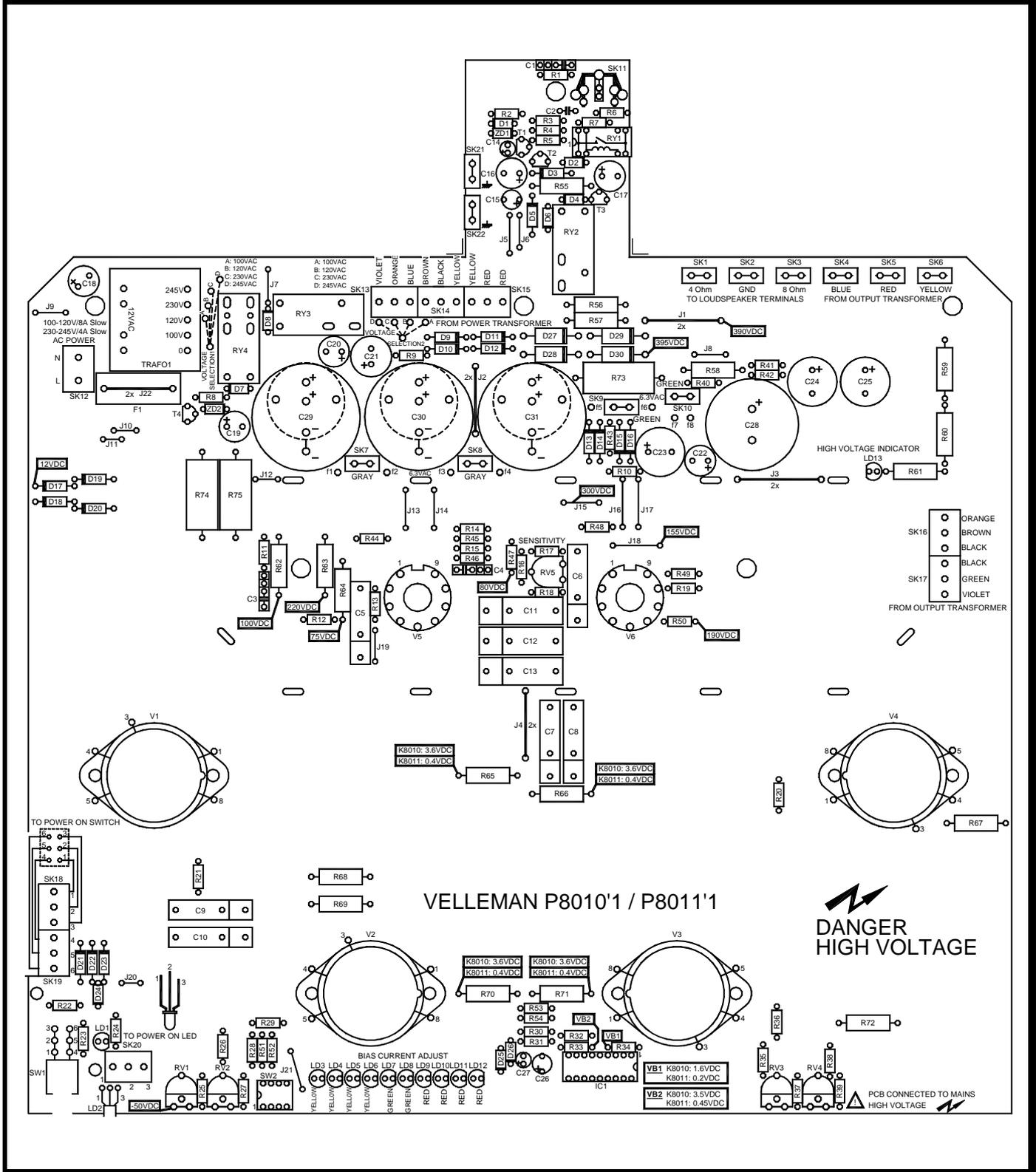
A valve that breaks down starts glowing cherry red. Turn off the unit immediately. Usually, the 47 ohm/1W cathode resistor of the defective valve will also need replacement.

*If you have the impression that for some reason, the unit still does not operate as it should, you can send it to our technical dept. for inspection. Send the PCB only, not the enclosure or the transformers. Use the original box. Include a detailed description of the fault. Check [www.velleman-kit.com](http://www.velleman-kit.com) for your nearest Velleman dealer.*

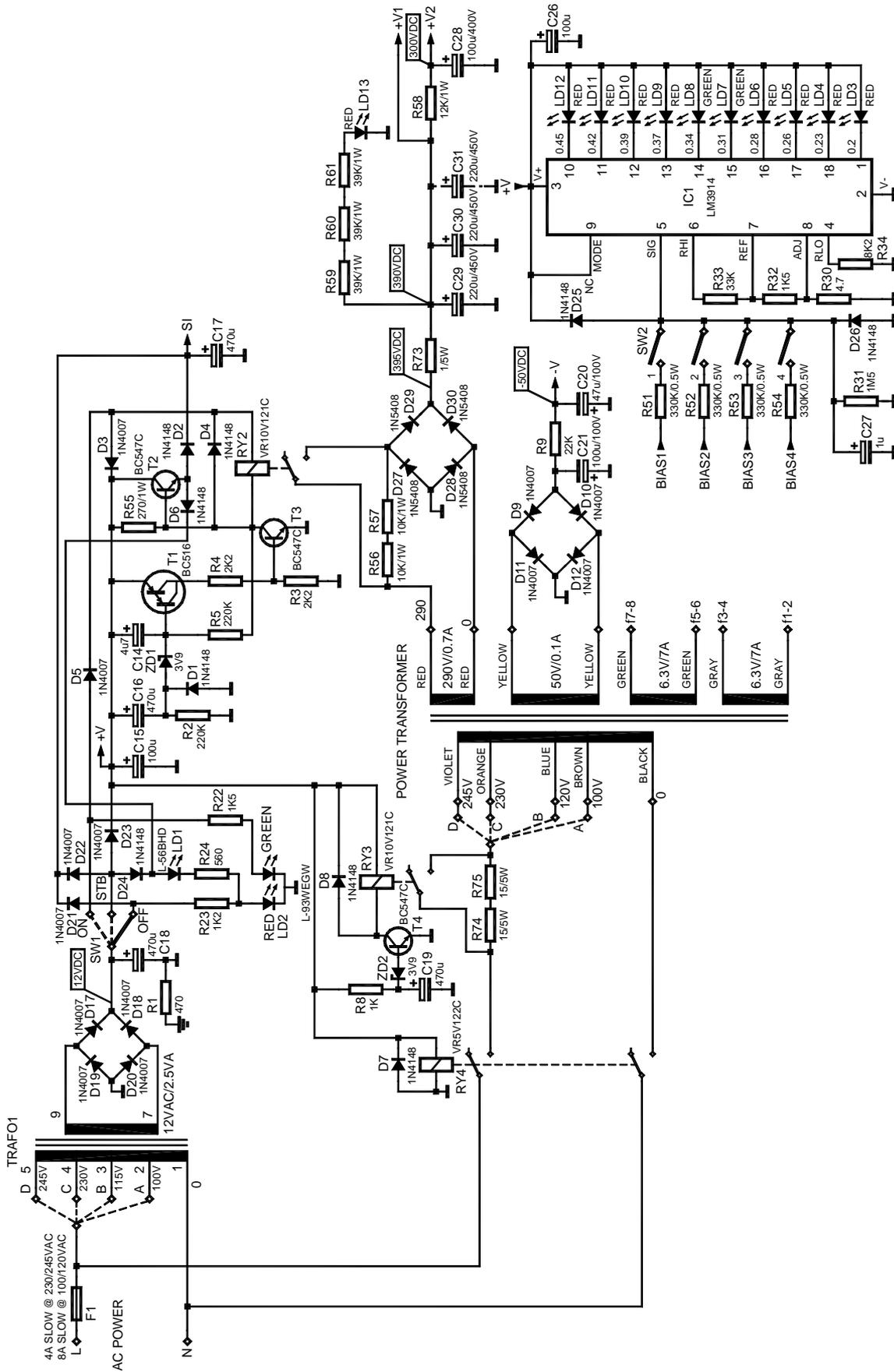
Velleman wishes you many hours of listening pleasure !

# DIAGRAMS

**PCB**



# DIAGRAM POWER SUPPLY SECTION



# DIAGRAM AMPLIFIER SECTION

